Scenario Identification and Evaluation for Layers of Protection Analysis

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Abstract
The identification and screening of scenarios has been identified as a source of error and variation in Layers of Protection Analysis (LOPA). This paper presents a simplified chemical process risk analysis as an effective means to minimize the overall time required relative to Hazard and Operability studies (HAZOP) while providing a semi-quantitative measure of consequence that may include human harm. The approach provides consistent results independent of the analyst and may be utilized in evaluation of Management of Change, inherently safer design decisions for capital projects, and LOPA revalidation. Conditional and relational logic may be captured through the use of simple spreadsheets to further improve overall efficiency.

The technique is based on simplification of established models that may be readily utilized by engineers engaged in the operation or design of a chemical manufacturing facility without special software and limited training. Results are realistic and may be directly compared with corporate or regulatory guidelines for risk of fatality or injury. At each step in the risk analysis process, more detailed or sophisticated methods may be used to refine the estimates. Furthermore, results from any step may indicate that the hazard from a specific scenario case is not sufficient to continue with subsequent analysis steps.